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ABSTRACT

A new methodology for testing preschool children's comprehension of television is described and the results of the first experiment with this method are presented. Original program material was created by filming 30 second animated stories in color and transferring them to videotape for subsequent editing and addition of sound. Thirty-five 3-year-old and 36 5-year-old children viewed the stories. Their reconstructions of the depicted materials were taped and scored. Analysis of total scores revealed an effect of age such that 5-year-olds reproduced more story units than 3-year-olds. However, the reconstruction patterns were very similar for both ages. Visual units were more likely to be reconstructed than auditory units. There was no effect of editing condition--(1) no edits, (2) zooms and pans, (3) cuts, zooms and pans--on total scores, though hints of an editing effect showed in the reconstruction protocols, such that the unit edited out was less likely to be reproduced. A substantial proportion of 3-year-olds reproduced the gist of the story, while most 5-year-olds gave connected, accurate reconstructions. This methodology offers both control over program variables and information about the quality and integrated nature of preschool children's representations of television content. (Author/CM)

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Preschool Children's Comprehension of Television

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A new methodology for testing preschool children's comprehension of television is described and the results of the first experiment with this method are presented. Original program material is created by filming 30 second animated stories in color and transferring them to videotape for subsequent editing and addition of sound. Seventy-one preschool children, 17 males and 18 females each at ages three and five, viewed the stories. Their reconstructions of the depicted materials were taped and scored. Analysis of total scores revealed an effect of age such that 5-yr. olds reproduced more story units than 3-yr. olds. However, the reconstruction patterns were very similar for both ages. Visual units were more likely to be reconstructed than auditory units. There was no effect of editing condition [(1) no edits, (2) zooms and pans, (3) cuts, zooms and pans] on total scores, though hints of an editing effect showed in the reconstruction protocols, such that the unit edited out was less likely to be reproduced. A substantial proportion of 3-yr. olds reproduced the gist of the story, while most 5-yr. olds gave connected, accurate reconstructions. This methodology offers both control over program variables and information about the quality and integrated nature of preschool children's representations of T.V. content.

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Presented at the biennial meeting of the Society for Research in Child Development, Boston, Mass., April 3, 1981. This research was supported by a facilities grant from the National Science Foundation and a research grant from the National Science Foundation, D.R. Anderson, Principal Investigator.

Research on the impact of television on very young children has been hampered in the past by the difficulty in testing young children's comprehension. Preschoolers' typically poor performance in comprehension tests of television shows may be due in part to the use of tasks which are inappropriate for this age group. Particularly problematic is reliance on verbal recall, given the lack of expository skills in preschoolers. Recent studies have attempted to deal with this problem by using recognition items, yes-no responses, or multiple-choice items. Each of these techniques has advantages, particularly for comparison with the scores of older children and adults. But none is designed to reveal the quality and integrated nature of the young child's representation of TV content. These techniques have tended to give us information mostly about the lack of abilities of the preschooler. New methodologies which are informed by an understanding of the behavioral repertoire of the very young child are needed to assess the competencies as well as deficiencies in their representation of TV content.

A further source of difficulty in testing comprehension has been the necessity of using already existing program material in which the structure of the content is confounded with contextual variables such as setting and characters, and with formal features of presentation such as editing techniques, music, and special effects. Daniel Anderson and I are developing a methodology which involves the preparation of original program material ideally suited for

testing young children's recall. We are using this method to study the development of comprehension of video narratives and of standard cinematic techniques. Although adults may automatically make the inferences necessary to comprehend edited television narratives, it is widely believed that the preschooler possesses neither the knowledge base nor the cognitive ability to perceive an edited sequence as other than a succession of states with little meaningful relationship to each other. Our research group has demonstrated experimentally that preschool children actively pay attention to television at those times when it is comprehensible to them. But how much do they actually comprehend?

We report here the results of our first study with this method. I will first describe the process of creating the programs and testing the children. We shoot animated color films of Fisher-Price dolls moving about a set such as a house, a school, or a replica of Sesame Street. The films are shot using a Super 8 film camera with single frame and automatic zoom capabilities, mounted on a tripod before a table illuminated by flood lamps. On the table is a nonreflecting gray mat on which is placed the Fisher-Price set and dolls to be used in the story. Animation is accomplished by moving the doll a short distance and shooting several frames, the distance and number of frames depending on speed and action requirements. For example, average "walking" speed for our purposes required 5 frames per quarter inch distance. Pans and zooms are readily accomplished even as the action apparently continues.

Before actual filming begins, each story is carefully blocked out with each shot determined in terms of lens setting, light level, character action, camera technique, and number of frames per movement distance.

Once the films are developed, they are transferred to 3/4 inch color videocassette by means of a Kodak VP-X film videoplayer. Subsequent editing is done using a 3/4 inch videotape editing system. Dialogue and sound effects are added as part of the editing process. The result is a reasonable quality color animated television program.

The scripts of the stories that we used in our first study are described in Table 1. We used three Fisher-Price sets - a house, a school, and a replica of Sesame Street - to create three different scripts. Each script was filmed in three different editing conditions. In the first condition, the action unfolded in front of a stationary camera. No special techniques were used and no events in the script were edited out. In the second condition, the camera panned and zoomed in at various points in the story, which are indicated in the Table. In the third condition, pans and zooms were combined with cuts, such that an event was eliminated by cutting from its previous to succeeding action or by cutting away to a different event. At this point, I would like to emphasize that the stories were very short, about thirty seconds each, and that the editing manipulations were mild ones. For example, the deleted action in the third condition of the house story consisted

of Billy walking down the stairs after being shown at the top and bottom of them.

We then assessed preschool children's comprehension of these stories After showing each story on a color monitor, we produced the Fisher-Price set and dolls and asked the children to reconstruct the story "as if you were making the same TV show" with the depicted set and dolls. The children expressed delight at the appearance of the same set after each viewing and seemed to enjoy the task. The entire session was videotaped for later coding by two observers. Interobserver agreement was very high. At this point, I would like to acknowledge the excellent work of Catherine Fischer in coding and graphing the data.

Our working procedure is to divide the story into basic units of action and dialogue. Each story in our first study consisted of 8 or 9 of these units. Children were given a chance to reconstruct the entire narrative without prompts first, and some did. After the first run-through , the experimenter then began with the first unit (either a single action or a verbal sentence) and systematically prompted the child to reproduce those units not reconstructed by enacting or stating the previous unit.

We tested 35 3-yr. olds and 36 5-yr. olds. Each child saw each of three stories in one of three editing conditions. Order of presentation was randomized. An analysis of variance of the total scores revealed a main effect of age. Figure 1 indicates that this age effect is due to a higher percentage of five-year olds reproducing each unit of the story. However, it is also evident from this graph

that the patterns of reconstructions are very similar for three and five-year olds. The correlation between percent 3-yr. olds and percent 5-yr. olds reproducing a unit ranges from .85 to .87 for performances which were unprompted and .75 to .85 when prompted reconstructions are included.

We compared the reconstruction of visual versus auditory units. These are shown in Figure 2. Again, 5-yr. olds were more likely to reproduce any given unit than 3-yr. olds. It is also clear that visual units were more likely to be reproduced than auditory units. Other investigators have suggested that preschoolers simply ignore auditory information on TV. Although our data would seem to support this position, alternative interpretations should be considered. These include the reticence of very young children in the presence of a stranger, and the fact that, as yet, we have no way to equate abstractness, and therefore difficulty of verbal versus visual information. Another possibility is that the auditory information is less important in these particular stories to getting the gist and therefore less likely to be encoded. Resolution of this issue awaits further research.

A major strength of this method is the opportunity it affords of observing the child's integrated representation of the story. If you will turn to Figures 3, 4, and 5, you will find our representations of the patterns of the stories. These graphs depict reconstruction performance as a function of temporal order. They are read from left to right. Arrows indicate the number of subjects entering a unit and the size of the unit indicates the percentage of

subjects reproducing that unit. Auditory units are symbolized by squares, visual units by diamonds.

Children at both ages generally start reconstruction at the beginning of the story. There were hardly any order inversions of units, and of a total of 170 reconstruction attempts, there was not a single intrusion or elaboration. Skipping units was common amoung three year olds in particular, the auditory units being more likely to be skipped than visual ones. For children at both ages there was a strong tendency to end at the major end-state of the character. Premature ending occurred and was more common among 3-yr. olds. A substantial proportion of 3-yr. olds gave the gist of the story and the 5-yr. olds generally demonstrated connected, accurate story reconstructions.

The analysis of variance revealed no effect of editing condition on total scores, but remember that the editing manipulations were mild and the stories very short. In examining reconstruction of unit 4 in the house story, which was deleted in the third editing condition, we found that children who saw the third condition were less likely to reconstruct that unit. This suggests that the action deletions typical of professional family television programs may produce considerably greater comprehension difficulties than we report here.

Finally, we found no relationship between total score and amount of television viewing by the children. However, the measure of viewing amount was the parent's estimate on a questionnaire.

and the accuracy of these estimates is as yet unknown.

We conclude that this is a promising methodology. Its use affords both control over program variables and information about the quality and integrated nature of preschool children's representations of television content.

TABLE 1

HOUSE STORY: The set depicting this story is comprised of a two-story house (open-view), with stairs leading down from the second floor to the front yard. There is a swing set (stage left) composed of a single and double swing.

Unedited: This version is simply a standard medium long shot of the set during the entire segment throughout all actions and dialogue.

Units: 1	2	3	4	5	6	7	8	9
Pans and Zooms: This version begins with an establishment shot: Billy and Mother are situated on the second floor, Susie is swinging on the single swing in the front yard.								
Zoom in to Billy and Mother. "Mom, can I go out and play with Susie?"	"Yes you may."	Pan Left to follow Billy walking down steps.	Pan Down to follow Billy walking down steps.	Pan Right to follow Billy walking to swing set.	Standard shot. "Hi Susie, want to go on the other swing?"	"O.K."	Pan Right to follow Billy and Susie walking to other swing.	Standard shot with both swinging. "Gee this is fun."
Pans, Zooms and Cuts: This version begins with the same establishment shot as in the version above								
Zoom in to Billy and Mother. "Mom, can I go out and play with--- Cut to Close-up of Susie swinging. ---Susie?"	Cut back to medium long shot of Billy and Mother. "Yes you may."	Pan Left to follow Billy walking to steps.			Cut to Billy standing in front of Susie on swing. "Hi Susie. Want to go on the other swing?"	"O.K."	Pan Right to follow Billy and Susie walking to other swing.	Standard shot of both swinging. "Gee this is fun."

SCHOOL STORY: The set depicting this story is comprised of a one story open-view building showing the inside of a classroom. The Teacher is standing stage right, and there is a table and chairs stage left. A school bus is outside of the building, stage left.

Unedited: This version is simply a standard medium long shot of the set during the entire segment throughout all actions and dialogue.

Pans and Zooms: This version begins with an establishment shot which shows the overall set, with the Teacher in the classroom, and the bus stage left.								
Bus drives up to school.	Zoom in to bus. "Here we are at school."	Pan Left to follow children walking into classroom.	Standard shot. "Good morning Teacher."	"Good morning children. Let's sit down."	Pan Right to follow everyone walking to seats.	Standard shot. All sit down.	Standard shot. "Gee I like school."	
Pans, Zooms and Cuts: This version begins with the same establishment shot as cited directly above.								
Zoom in to bus driving up to school	"Here we are at school! Cut to shot of teacher in classroom.	Cut Back to bus. Pan Left to follow children walking to and into classroom. Cut to close-up of bus driving away.	Cut to children standing in front of teacher. "Good morning teacher."	"Good morning children. Let's sit down."	Pan Right to follow everyone walking to seats.	Standard shot. All sit down.	Standard shot. "Gee I like school."	

SESAME STREET STORY: The set depicting this story is comprised of three buildings, one set at an angle to the others. One doll (Big Bird) is situated at the top of some stairs in a doorway, stage left. Another doll (Ernie) is situated at the corner of the angle, center stage. A third doll (Mr. Hooper) is in front of the doorway of his store, stage right.

Unedited: This version is simply a standard medium long shot of the set during the entire segment throughout all actions and dialogue.

Pans and Zooms: This version begins with an establishment shot which shows the overall set, with all characters in place.								
Zoom in on Big Bird. Big Bird walks down steps.	Pan Left to follow Big Bird walking to Ernie. "I think I'll get some ice cream at Mr. Hooper's store."	Big Bird walks to Ernie.	Standard shot. "Hi Ernie. Want to get some ice cream at Mr. Hooper's store?"	"Sure Big Bird".	Pan Left to follow both walking to Mr. Hooper.	Standard shot. "Hi boys. Come on in."	Standard shot. All walk into store.	Standard shot. "Gee, I like ice cream."
Pans, Zooms and Cuts: This version begins with the same establishment shot as cited directly above								
Zoom in on Big Bird. Big Bird walks down steps.	Pan Left to follow Big Bird walking. "I think I'll get some ice cream at Mr. Hooper's store." Cut to Mr. Hooper in front of store.	Panning Left to follow Big Bird walking to Ernie.	"Hi Ernie. Want to get some ice cream at Mr. Hooper's store?"	Standard shot. "Sure Big Bird."	Pan Left to follow both walking to Mr. Hooper.	Standard shot. "Hi boys. Come on in."	Standard shot. All walk into store.	Standard shot. "Gee I like ice cream."

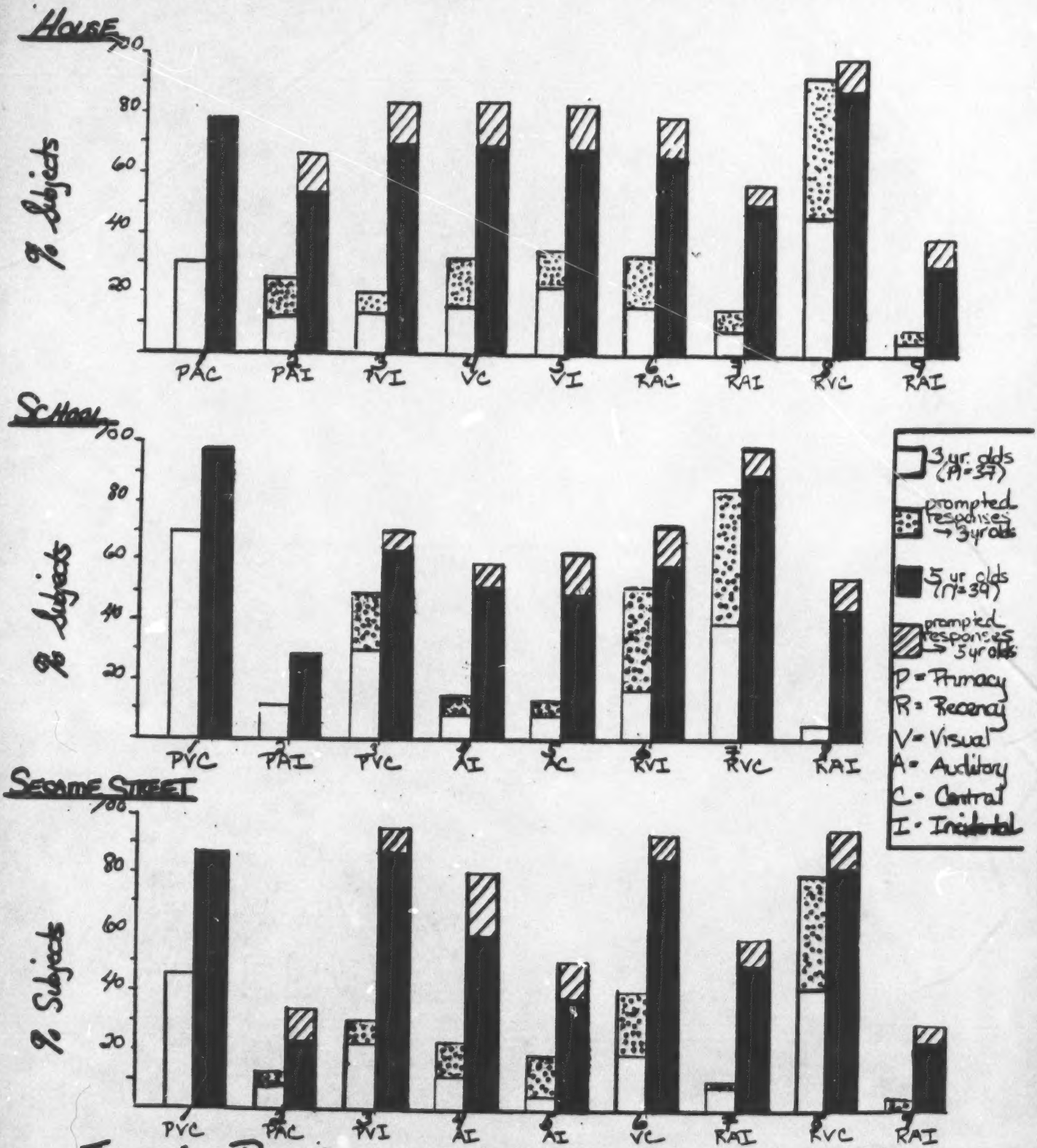


Figure 1: Percentage of subjects aged 3 and 5 who reproduced the given unit, before and after prompting by the experimenter

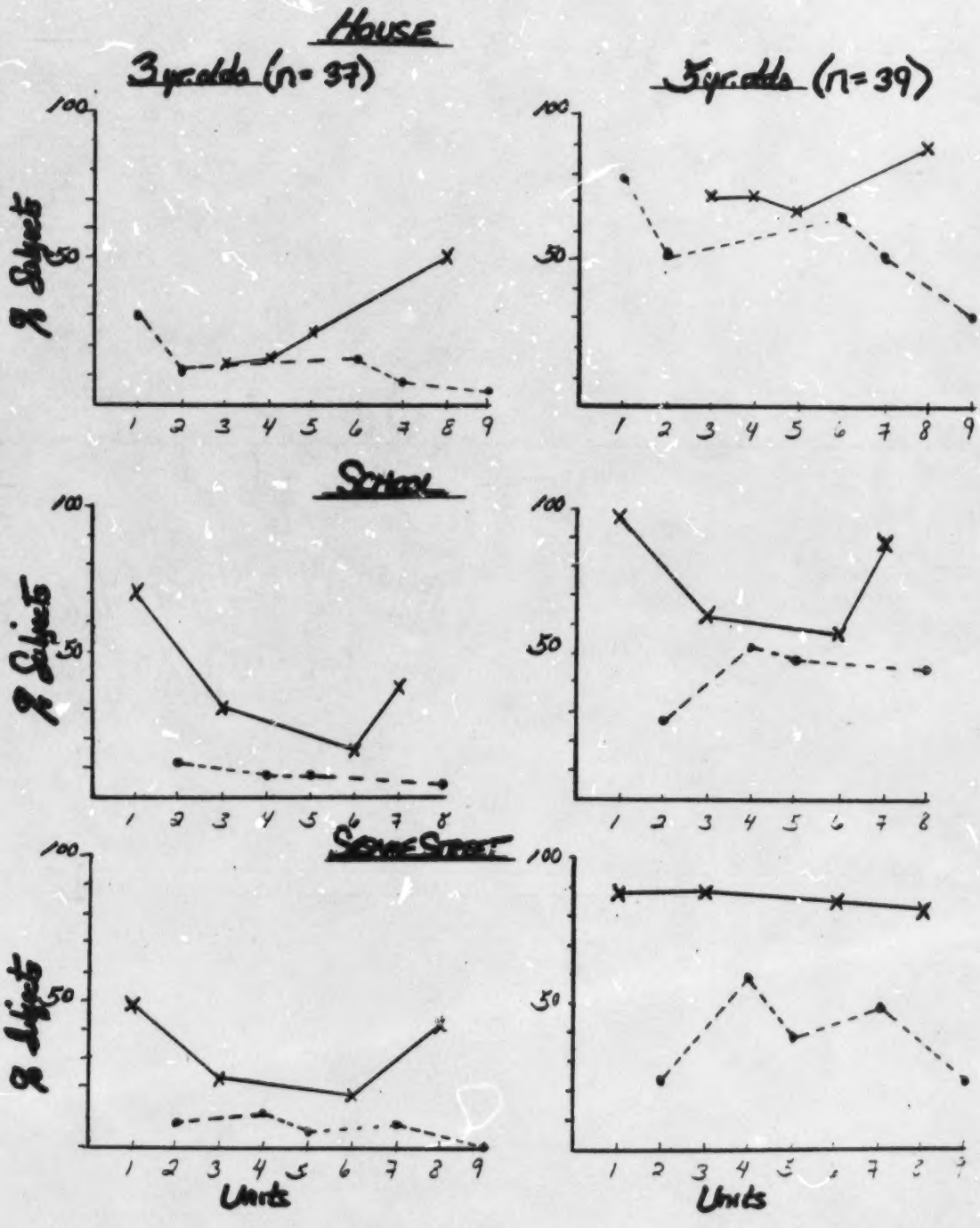


Figure 2: Percentage of subjects who reproduced the given unit of each story presented, grouped by ages 3 and 5.

HOUSE

Figure 3: The reproduction of units in sequence as done by subjects who were presented the HOUSE STORY, grouped by ages 3 and 5.

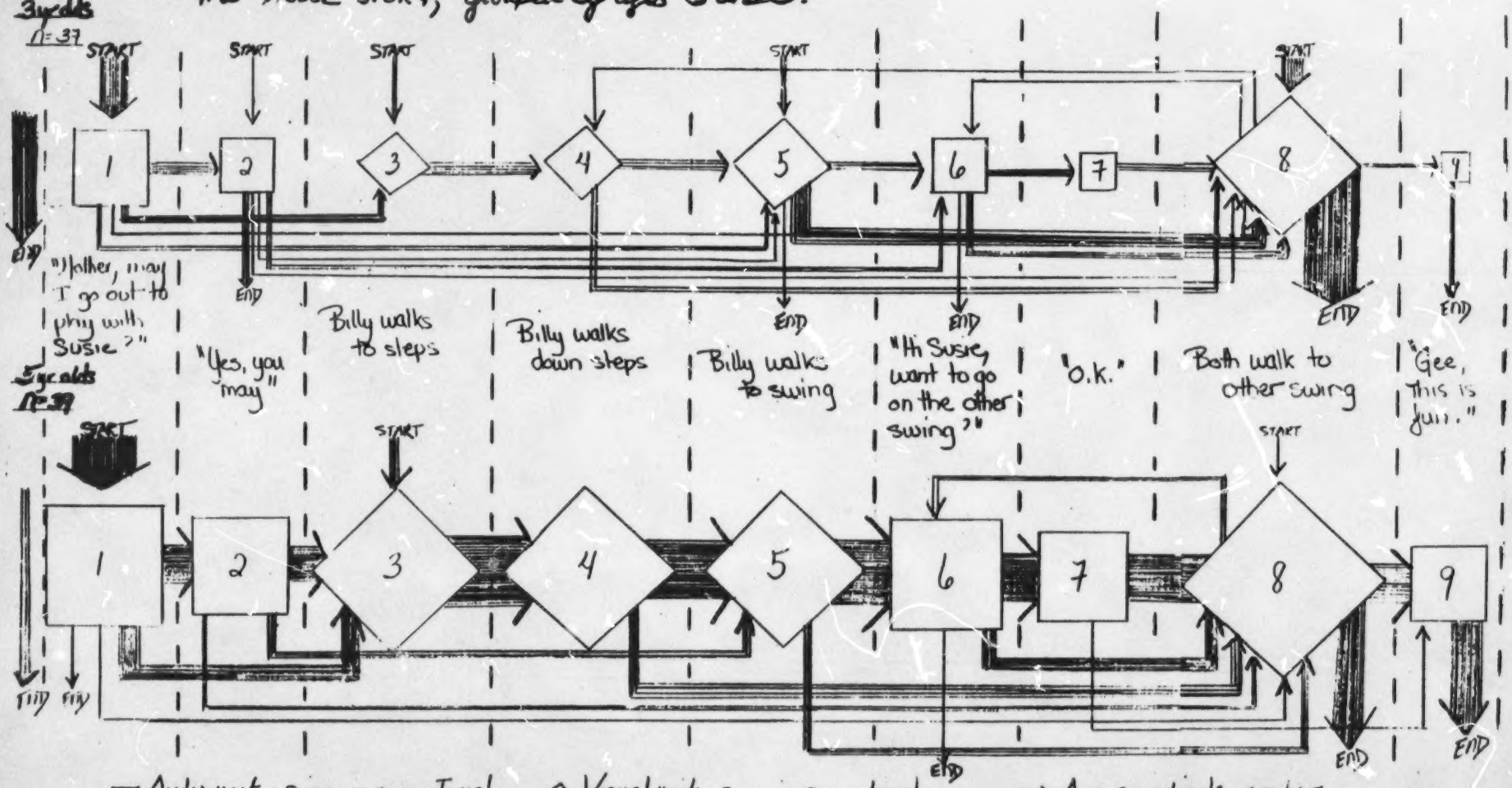


FIGURE 4: The reproduction of units in sequence as done by subjects who were presented the SCHOOL STORY, grouped by ages 3 and 5.

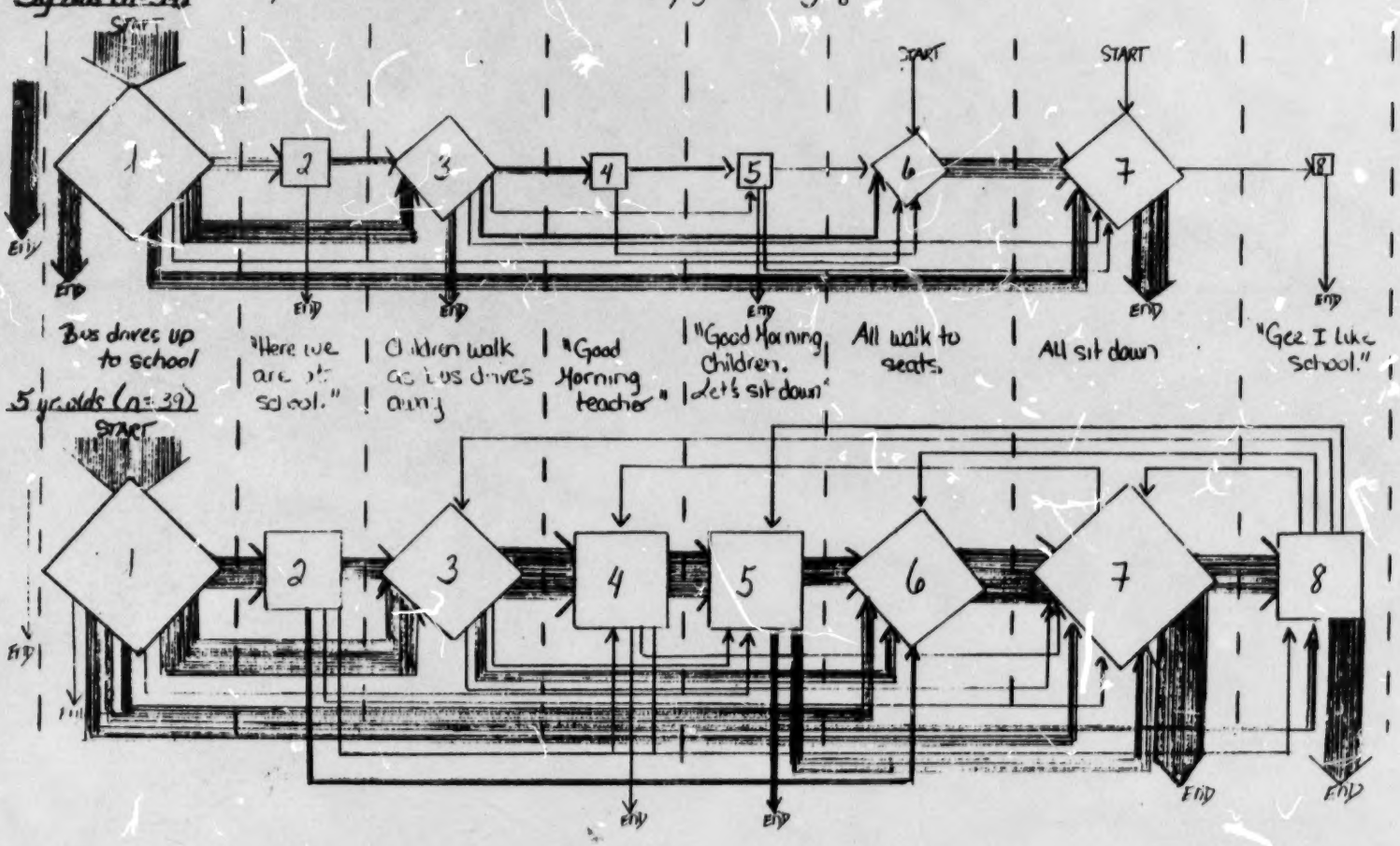
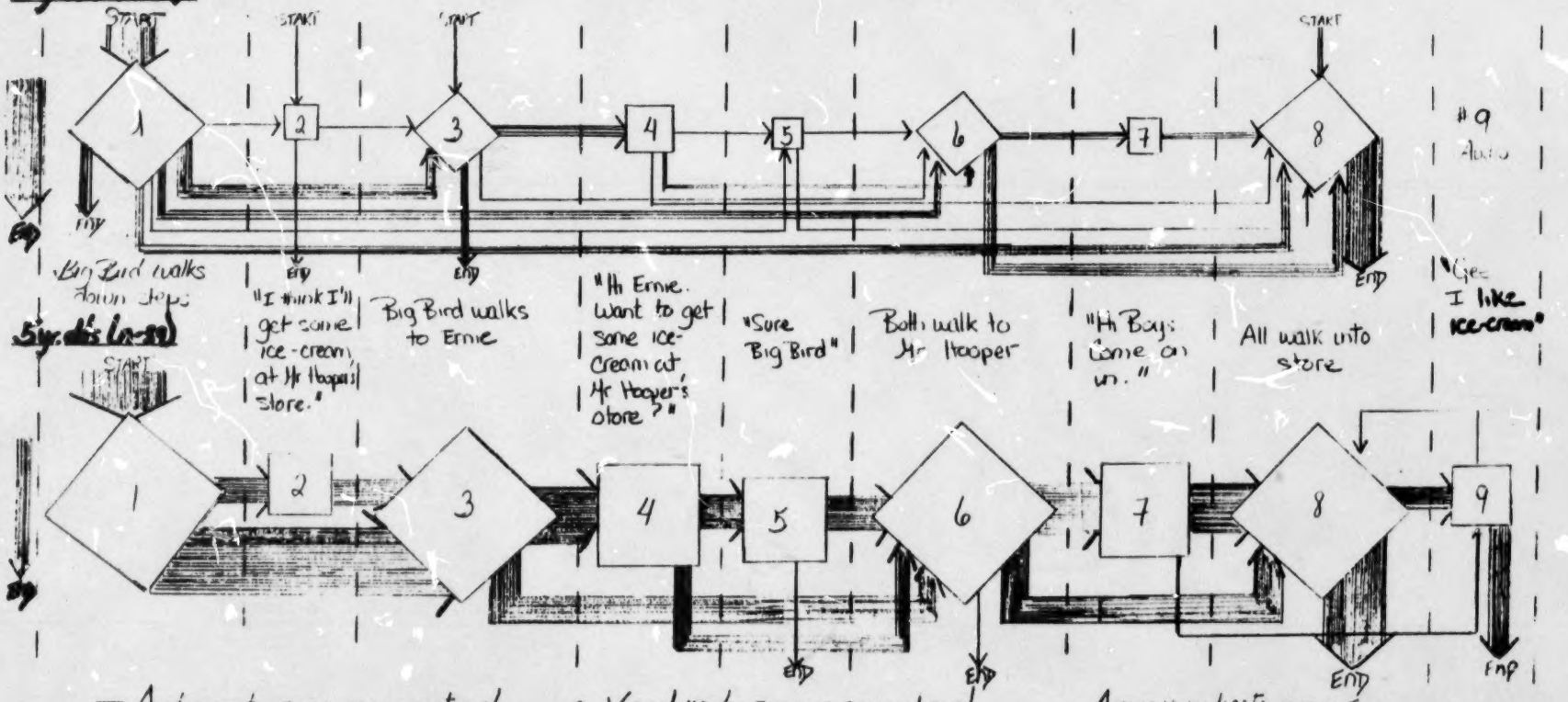


FIGURE 5 : The reproduction of units in sequence as done by subjects who were presented the SESAME STREET story, grouped by ages 3 and 5.

SESAME STREET



□ Audio unit; size is proportional to percentage of subjects.

◇ Visual unit; size is proportional to percentage of subjects.

⟶ Arrows indicate number of subjects entering unit.